PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH COLUMBIA

Firth Creek Habitat Enhancement Project 1993

A. R. Langston
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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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INTRODUCTION

Firth Creek is a small tributary stream of Firth Lake, and a component of the Firth-Hourston watershed. Discharge varies from 0.1 cubic m./sec. in July to approximately 2.0 cubic m./sec. during spring run-off (visual estimate May, 1993). Only two species of fish have been identified in this watershed, rainbow trout *(Oncorhynchus mykiss)*, and lake chub *(Couesius plumbens)*. Both of these species occur naturally in this system. The Ministry of Environment, Lands and Parks "Fisheries Program Strategic Plan 90/95" (1990) lists its first of four strategic objectives as conserving wild fish stocks.

Firth Creek was first surveyed as part of the inventory of the Firth-Hourston Lake system (Gunville 1977). A second survey occurred as part of a Firth Lake Reconnaissance Survey conducted in 1983 (Webber 1983). Both surveys indicated a potential for spawning habitat enhancement in Reach 3 of Firth Creek.

In April of 1993, a ground survey identified a site in Reach 3 that would be suitable for spawning habitat improvement. A detailed plan was developed, and permits allowing changes in and about a stream were obtained in preparation for the enhancement work. The primary objective of this project was to maximize the quality and quantity of spawning habitat, thereby addressing the conservation of wild fish stocks. Secondarily, this project was initiated to provide hands-on experience for B.C. Hydro's Native Environmental Youth Corp.

Development of the Enhancement Plan, permit application, technical expertise, and field supervision was provided by Peace/Williston Compensation Program fisheries staff. Funding and manpower was provided by B.C. Hydro (Central Area Production) through a Native Environmental Youth Corp. program developed by B.C. Hydro Prince George (Al Leake).

STUDY AREA

Firth Creek is located approximately 55 km. south of Mackenzie, B.C., and can be found on National Topographic Service Map 93 J/15, edition 3, 1:50,000 scale (figure 1). Exact U.T.M, coordinates of the work site are 10.5128.60815. The site is approximately 1 km west of the Peace-Williston Transmission Line corridor (500 kV lines 5L1, 5L2, and 5L7).

The work site is accessible via the Hodda Lake Mainline (main haul, gravel logging road), by travelling approximately 7 km Northeast from Highway 97 (figure 1).

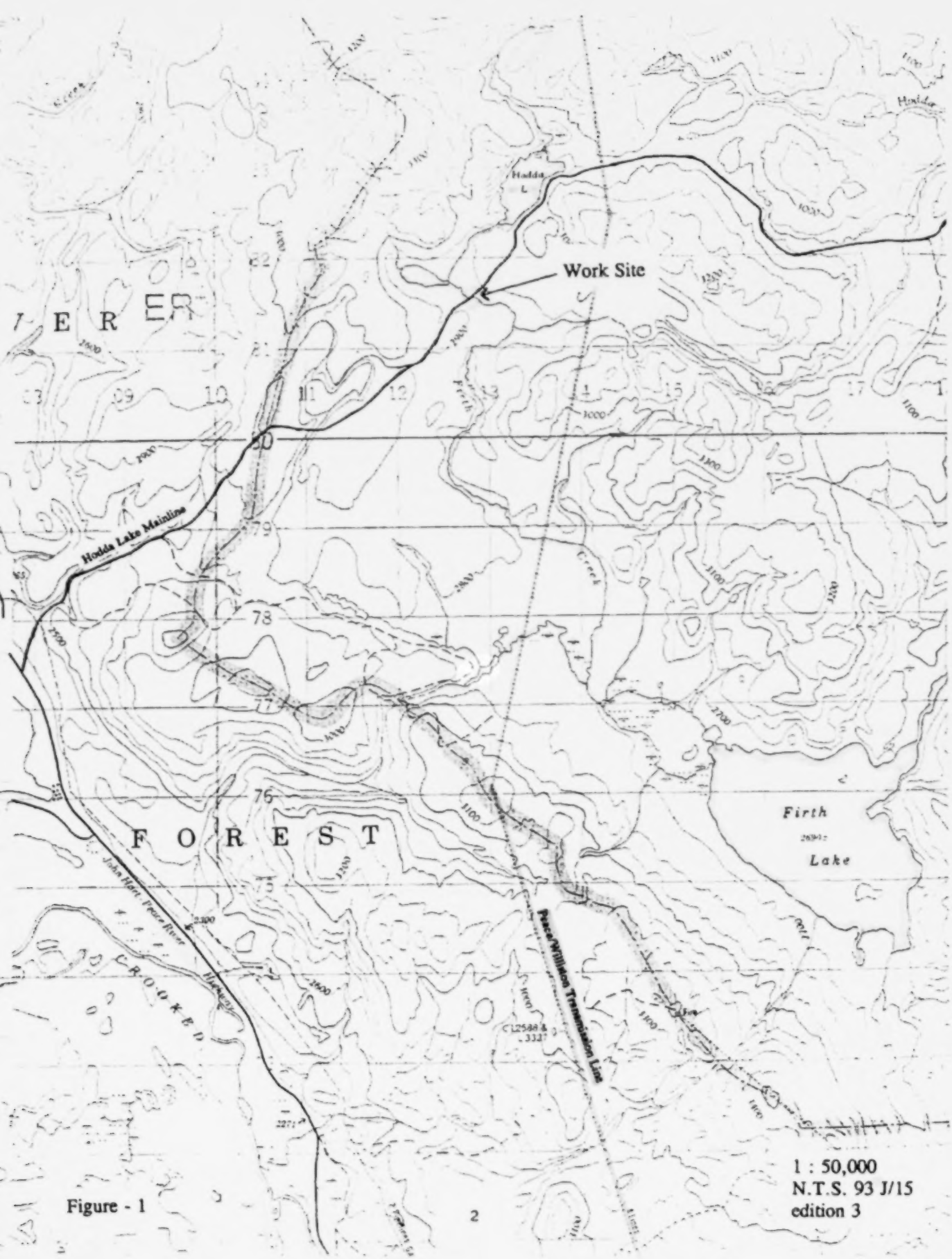
Work Site
Holda Lake Mainline
Firth
Lake
Peace/Williston Transmission Line
F O R E S T
C R O O K E D
1 : 50,000
N.T.S. 93 J/15
edition 3

Figure - 1

METHODS AND MATERIALS

Prior to the commencement of the enhancement work, the fish population of this site was identified by electrofishing at the work site, and the area downstream of the work site (figure 2). No stop nets were utilized, however the streams small size afforded near complete capture. Results of the electrofishing efforts are presented in Appendix 1.

A tracked excavator was used to excavate the stream channel, and place gravel and rip-rap. Rip-rap was donated by the Ministry of Transportation and Highways. The rip-rap varied in size from boulders requiring machine placement (for bank stabilization), to small boulders which could be placed by hand (for weir construction). The gravel was donated by the contractor performing the instream work, Lloyd Colquhoun. The gravel used was clean, no fracture, 1/2"-1" size range.

Design of weirs and groins was followed from the "Stream Rehabilitation Manual" (House et al., 1988). Spawning gravel was placed on most of the 85 m. of excavated channel. Gravel was raked to provide a smooth, contoured stream bed to prevent stranding in low flow conditions. Gravel depth averaged 10 to 15 cm.

RESULTS

Prior to enhancement work, this section of Firth Creek afforded minimal spawning habitat, primarily due to poor substrate quality and a high degree of channel braiding. Gravel addition, bank stabilization, habitat complexing, and channel definition (consolidation of flow), succeeded in producing a high quality spawning location for Firth Creek rainbow trout. Increased spawning success, and egg to fry survival should benefit the wild stock trout population of the Firth-Hourston drainage system.

The overall changes to the work site are presented in figures 2 (before), and 3 (after enhancement work). Figure 3 details locations, and types of enhancement structures/techniques employed.

Photographic plates 1 - 6 provide further before and after documentation of the enhancement work. Individuals present in these pictures are members of the Native Environmental Youth Corp. whose knowledge and interest in environmental work has increased as a result of participation in this project.

Firth Creek (prior to enhancement work)

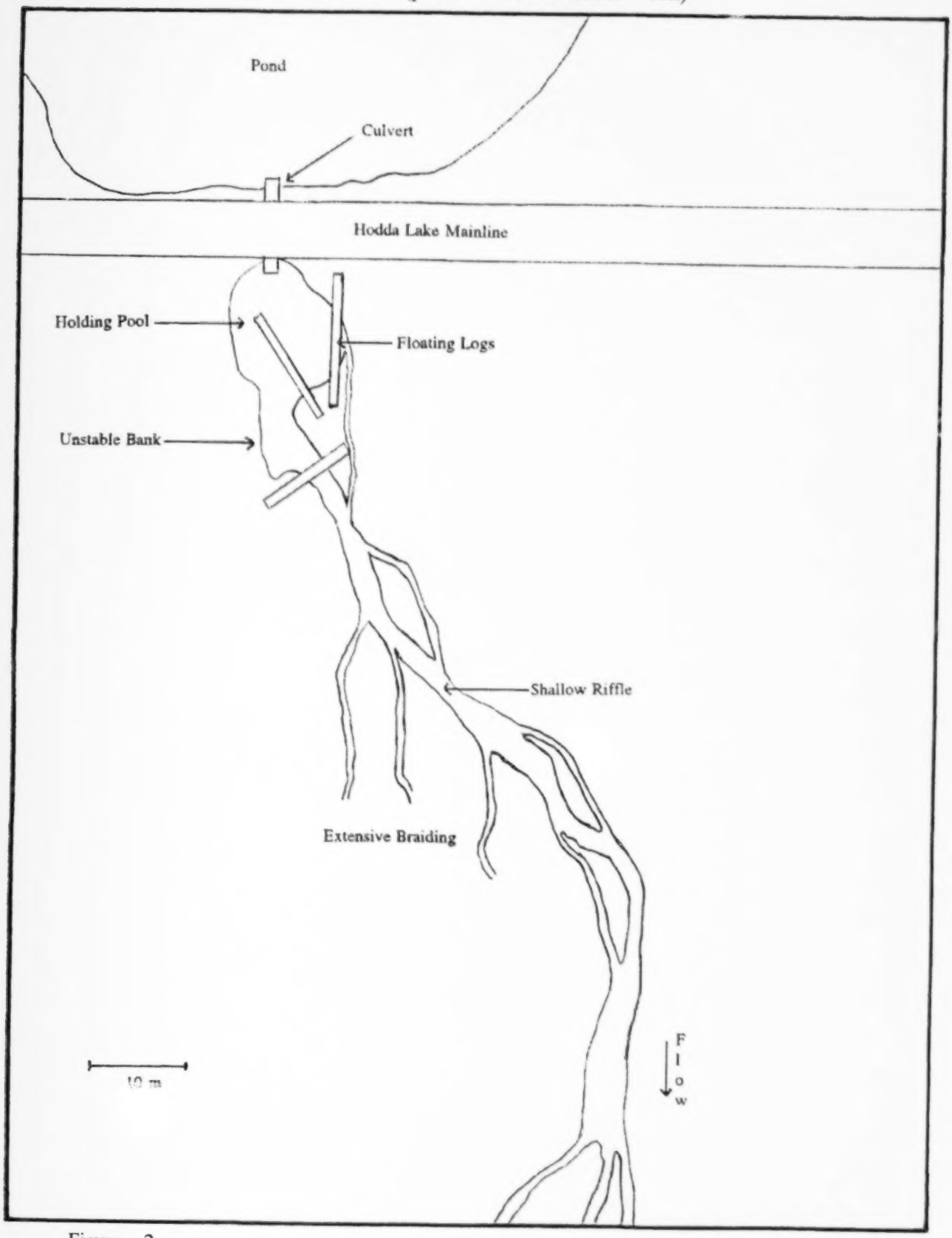

Figure - 2

Firth Creek (after enhancement work)

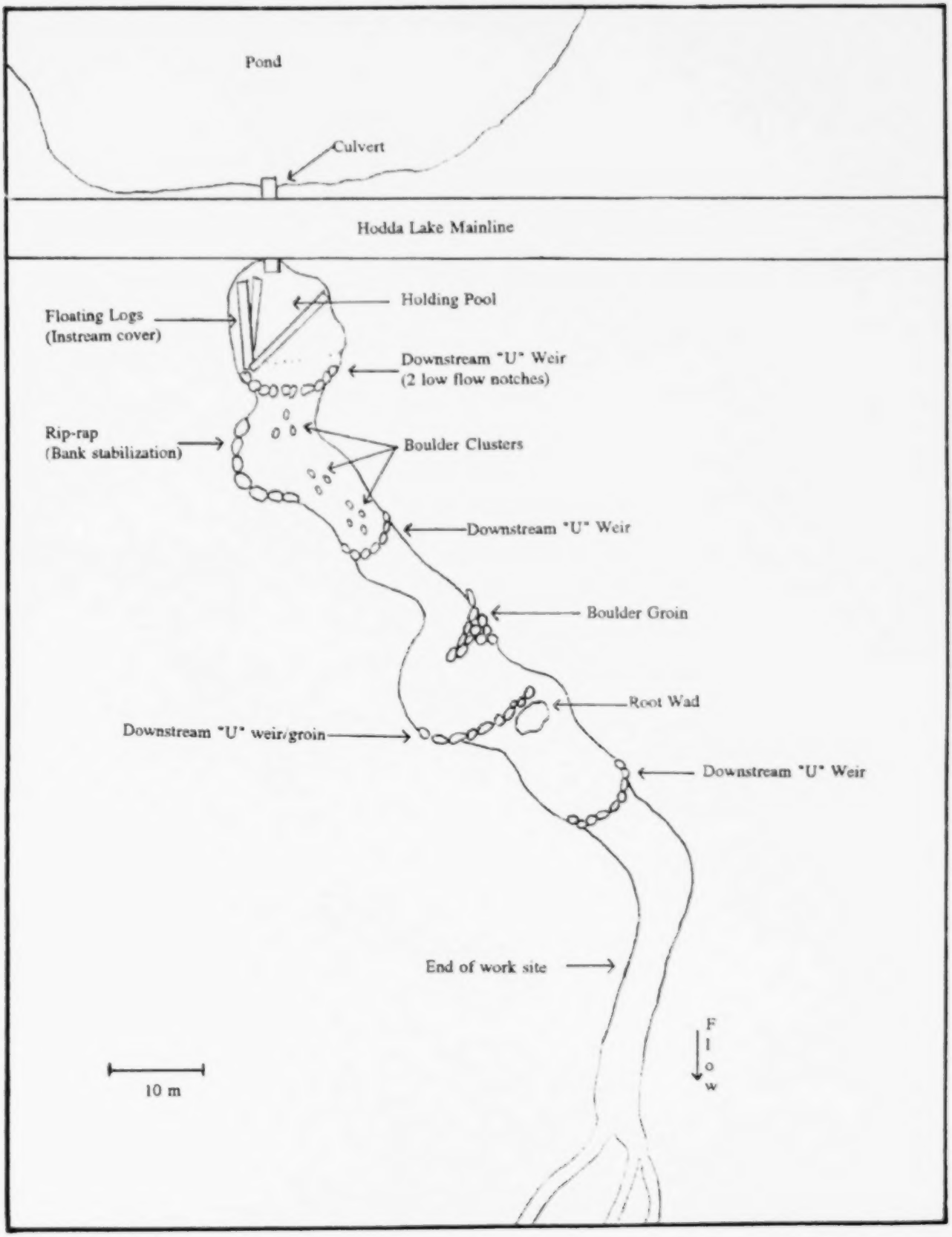

Figure - 3

Plate 1 - Prior to enhancement work. April 1993.
On Hodda Lake Mainline, looking downstream at Firth Creek.
Area of extensive braiding is in background.

Plate 2 - Prior to enhancement work. July 1993.
On Hodda Lake Mainline, looking downstream at Firth Creek.

Plate 3 - Downstream "U" weir, 15 m. downstream of culvert.
Note the two low flow notches.

Plate 4 - Environmental Youth Corp. building a downstream "U" weir.
Boulder cluster placement, and spawning gravel in foreground.

Plate 5 - Downstream "U" weir/groin, with rootwad behind.
Raking gravel spawning bed in foreground.

Plate 6 - On Hodda Lake Mainline looking downstream at completed work.
Note floating logs in the holding pool for instream cover.

REFERENCES

B.C. Environment, 1990. Fisheries program strategic plan 90/95. Public document released by the B.C. Ministry of Environment, Lands and Parks. 21 pp.

Gunville, G.F. 1977. An inventory of the Firth-Hourston Lake system, unpublished. Reference copies located at Inventory and Operations Unit, Water Management Branch, Victoria, Fish and Wildlife Branch, U.B.C., Vancouver and Fish and Wildlife Branch, Prince George.

House, R., J. Anderson, P. Boehne, and J. Suther. 1988. Stream rehabilitation manual. From the workshop "A training in stream rehabilitation, emphasizing project design, construction and evaluation. Oregon chapter of the American Fisheries Society.

Webber, T.N. 1983. A reconnaissance survey of Firth Lake, unpublished. Reference copies located at Inventory and Operations Unit, Water Management Branch, Victoria, Fish and Wildlife Branch, U.B.C., Vancouver Fish and Wildlife Branch, Prince George.

APPENDIX I

(Electrofishing Results)

Electrofishing Results

Location Firth Creek, started 300 m downstream of Hodda Lake Mainline crossing. Worked upstream to the culvert at the road crossing.

Area sampled 450 m^2 (length = 300 m, width = 1.5 m)

Water Temperature 12.0 °C.

SPECIES	LENGTH (mm)	WEIGHT (g)		SPECIES	LENGTH (mm)	WEIGHT (g)
Rb	38	0.6		LKC	46	0.9
Rb	80	5.7		LKC	46	1.0
Rb	84	5.0		LKC	46	1.0
Rb	92	8.4		LKC	46	1.0
Rb	94	8.6		LKC	46	1.4
Rb	96	8.7		LKC	48	1.0
Rb	96	11.6		LKC	48	1.2
Rb	98	10.7		LKC	52	1.2
Rb	98	11.9		LKC	52	1.4
Rb	98	13.2		LKC	56	1.5
Rb	108	17.7		LKC	64	2.6
Rb	110	16.4		LKC	70	3.2
Rb	112	13.9		LKC	70	3.5
Rb	114	17.0		LKC	72	3.5
Rb	118	18.5		LKC	72	4.1
Rb	120	21.2		LKC	72	5.0
Rb	136	24.6		LKC	76	4.3
Rb	136	25.5		LKC	78	4.2
LKC	42	0.7		LKC	84	5.2
LKC	42	1.0		LKC	86	7.2

Rb denotes rainbow trout
LKC denotes lake chub